WA-Trans Risk Assessment for WA-Trans Project
As of December 4, 2002

Introduction

A risk assessment is a key component of a risk management plan. A well-done risk assessment will provide a timeline for watching for specific risks and mitigation strategies that can be implemented when a particular risk is "triggered". The risk assessment for WA-Trans was begun very early in the project and some of the mitigation strategies are already in place and working as anticipated. Because of the continuing nature of the risk management throughout the lifecycle of a project all risks that seem possible at any point of the project have been identified. However new risks will appear and this document should be updates at a minimum for each phase, and very likely more often.

This document defines risks as a combination of "*risk conditions*" and "*risk consequences*". A particular risk condition may have multiple risk consequences. That is illustrated though out this risk assessment. Sometimes a risk consequence becomes a risk condition for other consequences. They interdependent nature of risks means there may be multiple similar risks documented. For each risk combination an impact is defined. *Impact* is defined as the "loss or effect on the project is the risk occurs". *Probability* is defined as "the likelihood the risk will occur". The *timeframe* is defined as "the period when action is required in order to mitigate the risk" Timeframe is referred to as "Time" in this risk assessment. *Risk exposure* (RE) is defined as an attribute of risk that is derived from impact and probability using the following relationship: "RE = Prob(UO) * Loss(UO) where Prob(UO) is the probability of an unsatisfactory outcome (UO) or risk, and Loss(UO) is the loss to the parties affected if the outcome is unsatisfactory (i.e., the risk occurs)." In this case probability was assigned based on whether it had already occurred or appeared to be likely to occur. These are subjective judgments, which will benefit from input for all stakeholders.

The following table illustrates how the relationship between impact, probability and risk exposure were evaluated for this risk assessment both qualitatively and quantitatively:

	Probability			
Impact	**Frequent (4)**	**Probable (3)**	**Improbable (2)**	**Impossible (1)**
Catastrophic (4)	High (16)	High (16)	Moderate (8)	None (4)
Critical (3)	High (12)	Moderate (9)	Moderate (6)	None (3)
Marginal (2)	Moderate (8)	Moderate (6)	Low (4)	None (2)
Negligible (1)	Moderate (4)	Low (3)	Low (2)	None (1)

i

This document can be used to assess risks and provide guidance to recognize approaching risks and plans made early in the project which allows for the contingencies and project structures to be implemented which support specific mitigation strategies through out the project and the use of continuous risk management as a major project management tool. The charter, work plan, budget and communication plan should all be coordinated with the risk assessment in mind to support the use of continuous risk management.

Legend

Impact Rating: *1* – Negligible, *2* – Marginal, *3* – Critical, *4* – Catastrophic
Risk Exposure Level: None, Moderate (Mod), High

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Risk #	Risk Condition		Risk Consequence	Imp-act	Prob-ability	Expo-sure	Time	Mitigation Strategy
1.	The project doesn't get key stakeholder executive understanding, support, sponsorship	a.	Stakeholders don't participate.	4	3	High	P1	• Communication appeals to executives (1), • Cost/Benefit analysis showing value of participation targeted at different government levels, different business functions (1), • Create summaries of business needs targeted at different government levels, different business functions (1), • Complete pilot to demonstrate usefulness (1), • Use pilot to show cost and resources needed specifically (1), • Continue to refine a broad-based business needs assessment including new partners and user groups as discovered (1), • Find alternative data sources such as purchase or use from other groups or developing from ortho-photos. Include cost of such measures in plans and budgets (1e).
		b.	Stakeholders don't provide resources.	3	3	Mod	P1, P2, P3	
		c.	Stakeholder organization's business needs are not identified.	3	3	Mod	P1	
		d.	Stakeholders don't plan and identify funding opportunities and financial incentives.	4	3	High	P1, P2, P3	
		e.	Stakeholders' data is not available to the framework.	3	3	Mod	P2, P3	
2.	The project doesn't get funding	a.	The project fails to make progress on deliverables.	4	4	High	P1, P2, P3	• Pursue grant opportunities where possible (2a),

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		b.	WSDOT pulls project resources.	4	2	Mod	P2, P3	• Get administrative help with grant writing skills (2a), • Set up schedule with associated time constraints and risk for: an all volunteer project, a limited budget project, higher budget project based on target completion date (2a), • Pursue use of paid university students to do much of work at lower costs (2a), • Find a secondary facilitator (2b), • Leverage existing project funding by identifying areas where WA-Trans will save and use potential savings to pay for WA-Trans (2), • Develop a sub-committee on grants to look for and pursue opportunities (2), • Sell the project directly to the legislature as a cross-agency, statewide project (2), • Reduce the project expectations and scope to lower the cost (2), • Document process well and be ready for turnover (2b).
3.	The project is unable to schedule key resources at the needed time	a.	The project schedule is not followed.	3	4	High	P1, P2, P3	• Communicate costs of changes to stakeholders on a regular basis (3a, 3b, 3d), • Have alternatives planned for each resource (3a, 3b, 3d), • Use change management process to deal with resource losses (3a, 3b), • Develop alternative schedules for various resource combinations (3a, 3b, 3d).
		b.	The deliverables are not completed on time.	3	3	Mod	P1, P2, P3	
		c.	Contractors work the project and key knowledge is lost.	2	2	Low	P3	

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		d.	Knowledge about data is not available thus tasks and mistakes consume time inefficiently.	2	3	Mod	P2, P3	3d), • Balance use of contractors with technicians with long term value of WA-Trans to keep knowledge (3c), • Use contractors only for simple, repetitive tasks and other staff for key integration decisions and development of processes requiring long term maintenance (3c), • Accept the loss of knowledge and make up for it in the maintenance process (3c), • Contract out maintenance as well (3c).
4.	Different stakeholders have directly conflicting requirements	a.	The project plan is not developed in a timely manner.	3	2	Mod	P1	• Use steering committee to reduce the number of participants in the detailed discussion to more quickly resolve conflicts (4), • Use negotiation techniques to resolve conflicts (4),
		b.	Key stakeholders abandon the effort.	4	2	Mod	P1	• Used phased approach to demonstrate commitment to meeting all business needs (4a, 4b, 4c), • Focus on one group of stakeholders at a time to manage scope (4)
		c.	Functionality agreed to does not meet the needs of stakeholders.	4	2	Mod	P1	• Develop alternative plans so there is a view for how different priorities affect the project (4a).
		d.	Stakeholders' data will not work with the framework.	4	2	Mod	P2, P3	• Allow those with more unique business needs which don't share data or functionalities with common ones to pay for the additional cost of meeting their need (4c, 4d), • Look for common functionalities and data needed for all business needs and meet the most common requested in phase 1 (4), • Use pilot to evaluate alternative approaches to provide data for resolving conflict (4)
5.	WSDOT decides not to support the effort	a.	Project Manager is pulled from the project.	4	2	Mod	P2, P3	• Find a secondary facilitator (5a),

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		b.	There is no central focal point for the project.	3	1	Low	P2, P3	• Document process well and be ready for turnover (5a),
		c.	The project is unable to meet internal WSDOT business needs.	3	2	Mod	P2, P3	• Determine who has most benefit-cost remaining and ask them to lead the effort (5a, 5b), • Continuously reevaluate needs and commitment while still participating and working on the project (5) • Document cost for WSDOT of not participating and cost for not leading effort (5).
6.	The business needs identified by funding organizations are too complex for time available to develop the first release	a.	Funding opportunities are lost.	4	3	High	P3	• Provide option for "purchase" (RFQ) of data for short-term use (6a, 6b), • Perform continuous risk management including assessing the risks of each requirement to meet a business needs (6), • Add a contingency factor in the budget and schedule for risk assessed on complex business needs (6), • Use a carefully constructed RFP to contract out the complex portions of the project and share the risk with the contractor (6), • Provide a release of WA-Trans that is a starting point for them and they can adapt and refine it to meet their specific needs (6).
		b.	Competing base-maps/frameworks are established	4	2	Mod	P3	
		c.	The framework project "fails" when it tries to meet a need that is too high- risk for first release.	4	2	Mod	P2, P3	
7.	Band width doesn't support data exchange	a.	Data transfer viewed as "too slow" by framework users (lower satisfaction).	4	3	High	P2, P3	• Pilot testing of the largest most complex data sets to troubleshoot packet size and number of packets transferred (7a), • Contract out hosting of WA-Trans, with minimum specifications for speed, bandwidth (7a, 7b).
		b.	Framework is not used.	4	1	Low	P3	
		c.	Negative impact on "hosting organization's" network speed and local applications.	4	2	Mod	P3	
8.	Development of the base-map with attribution is too	a.	Funding/resource opportunities are lost.	4	4	High	P1, P2, P3	• Attach a funding requirement to meeting urgent needs (8),

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	slow for some business needs identified	b.	Competing base-maps/frameworks are established.	4	2	Mod	P3	• Provide option for "purchase" (RFQ) of data for short-term use (8b), • Use pilot to show value of providing data in WA-Trans (8c), • Consider a scaled down version for a first release, with a release schedule for addition attribution (8). • Determine if there is a regional prioritization and do those first (8).
		c.	Some potential stakeholder's data is not available.	4	3	High	P3	
9.	Funding and data agreements and architecture don't include maintenance costs and plans.	a.	Framework data and data agreements becomes obsolete.	4	4	High	P-P3	• Making maintenance a requirement of the data sharing agreement (9a, 9b, 9c), • Include maintenance costs in any funding requests (9), • Include maintenance as part of any pilot efforts so costs and impacts can be accurately tracked, communicated and evaluated (9), • Include a regular QA cycle as part of WA-Trans maintenance to check for quality of data and maintenance over time (9), • Update WA-Trans for orthophotos and other sources where maintenance can't be relied upon (9), • Begin implementation of Ken Dueker's proposal for long-term maintenance of WA-Trans.[ii]
		b.	There is no responsible entity for maintenance identified.	4	4	High	P3	
		c.	Framework is not used.	4	2	Mod	P3	
		d.	Some data will not work with the framework over time.	4	2	Mod	P-P3	
10.	Conflicts exist with security levels needed to meet identified business needs	a.	Some stakeholders refuse to provide data.	4	3	High	P2, P3	• Gather security needs as part of the requirements process and allow some level of security of some data (ex. data for emergency services may be excluded from general access) (10a, 10b, 10c), • Develop a security system for updating data and for accessing data which facilitates security needs (10a, 10b), • Provide a "public domain" version and other versions, attribution or layers for some specific users and uses (10a, 10b), • Determine methods of funding which may include providing funds for offices which use data sales as a means of funding GIS programs (10c)
		b.	Data is provided to some who should not have access.	3	2	Mod	P-P3	
		c.	Stakeholders have insufficient means of charging for cost of providing data.	2	2	Low	P2, P3	

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11.	Stakeholders don't have funds to provide data in a format needed for the transportation framework.	a.	Some stockholder's data is not available for the framework.	4	2	Mod	P2, P3	• Include the need for funding activities for data providers in funding proposals and requests (11), • Develop translators to convert the data into the correct format for WA-Trans, (11a, 11b) • Provide some sort of grant program so those with data and funding needs can get a grant to assist with this activity (11a, 11b) • Staff WA-Trans with staff members that can go to the data providers to do this work with and for them (11a, 11b), • Use the pilot to determine factors, which help estimate costs and time for individual providers to convert their data and use this information when seeking funding and in CBAs (11a, 11b, 11d).
		b.	Stakeholders don't participate in the project.	4	2	Mod	P2, P3	
		c.	Framework is not used due to not having the "best available" data.	4	2	Mod	P-P3	
		d.	Framework costs more to convert data.	3	4	High	P2, P3	
12.	Formal data agreements are not established with data providers	a.	Framework data becomes out of date.	4	3	High	P-P3	• Require completion of a formal data sharing agreement before utilizing data (12), • Include maintenance plans in front end plans for WA-Trans and facilitate them through out (12), • Include a regular QA cycle as part of WA-Trans maintenance to check for quality of data and maintenance over time (12 a, 12b), • Update WA-Trans for ortho-photos and other sources where maintenance can't be relied upon (12) • Include the cost of developing data sharing agreements in all budgets and schedules (12)
		b.	Data changes are not managed so the framework data has less credibility	4	2	Mod	P-P3	
		c.	Framework is not used.	4	2	Mod	P-P3	
13.	Pilot projects are completed before a detailed business needs assessment is completed	a.	Pilots are deemed not useful because they don't represent needs and don't meet business requirements.	3	2	Mod	P2	• Develop a schedule which begins pilots after completion of business needs assessment and requirements analysis (13b), • Perform risk management on pilots done prior to completion of business needs assessment and requirements analysis to determine and document

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		b.	Pilots compete for scarce resources with gathering business needs thus having less than needed for both.	2	2	Low	P1, P2	needs assessment and requirements analysis to determine and document how likely they are to represent the final version of WA-Trans (13a), • Perform change management on any scope changes that includes the costs of pilots, which are different and results, which must be negated (13a).
14.	Business needs are not identified during the business needs assessment effort	a.	Scope changes occur later in the process (costing more money) because new needs are identified.	2	3	Mod	P2, P3	• Make an effort to identify as many players as possible as early as possible to get complete needs collected (14a), • Develop change management process for handing scope changes once business requirements and prioritization is complete (14a),
		b.	Some stakeholders don't participate because they don't see TFW meeting "their" business needs.	3	3	Mod	P2, P3	• Use phased approach for adding functionality and attribution and improving accuracy over time (14b), • Continue to document different business needs so the project maintains information about what is needed by participants (14b).
15.	Regular communication is inadequate or through mediums not easily accessible to stakeholders	a.	Stakeholders don't participate in project, meetings, or major decisions affecting them.	4	2	Mod	P1, P2, P3	• Develop a complete communication with different means of communicating with potential stakeholders (15), • Develop cost, resource and time assessments and publicize them (15a, 15b),
		b.	Stakeholders don't provide funding and resources.	4	2	Mod	P1, P2, P3	• Develop cost benefit analysis to justify participation and funding (15a, 15b),
		c.	Business needs aren't identified or are identified in a non-timely way.	4	3	High	P1, P2, P3	• Allow sources of funding and resources greater say in prioritization process (15b), • Continue to document different business needs so the project maintains information about what is needed by participants (15c).
16.	Inadequate cooperation between jurisdictional and	a.	Data is missing	4	3	High	P3	• Use the steering committee to minimize the cooperation complexity and coordinate the effort (16)
		b.	The framework isn't used	4	2	Mod	P-P3	

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	political boundaries	c.	Data won't "connect"	3	2	Mod	P-P3	coordinate the effort (16) • Develop software algorithms to facilitate data integration (16c), • Develop agreements and funding for supporting long term integration (16) • Provide option for "purchase" (RFQ) of data for short-term use (16a), • Use alternative sources for data including orthophotos to compensate for missing data (16a).
17.	Lack of education or knowledge regarding framework concept or GIS	a.	Unwillingness or inability to participate	4	4	High	P1, P2, P3	• Develop a communication plan and presentation materials that will educate participants about WA-Trans (17a, 17c),
		b.	Unrealistic expectations developed regarding project deliverables	3	3	Mod	P2, P3	• Develop and continue to refine estimates of scope, cost and schedule with assumptions documented and communicate those whenever possible (17b),
		c.	Business needs not identified	4	4	High	P1, P2, P3	• Continue to document different business needs so the project maintains information about what is needed by participants (17c),
		d.	Framework not used	4	2	Mod	P-P3	• Use meetings to document business needs as opportunities to educate potential participants about the WA-Trans (17),
		e.	Data needed for a jurisdiction not made available	4	2	Mod	P3	• Develop change management process for handing scope changes once business requirements and prioritization is complete (17c), • Use alternative sources for data including orthophotos to compensate for missing data (17e).
18.	Difficulty reaching consensus regarding technical issues such as: conflicting segmentation	a.	Stakeholders decide not to participate	4	3	High	P1, P2, P3	• Look at what other states are doing and at other standards (particularly RoadMAT) to get guidance on how to do this (18),
		b.	More time than is anticipated is spent resolving the issue	3	3	Mod	P1, P2, P3	• Use lessons learned, standards and data models already implemented from other sources to prevent some of the same difficulties (18),

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	criteria, data model design, attributes, and LRS measures.	c.	Identification of roads is significantly more complicated or costly	4	2	Mod	P2, P3	from other sources to prevent some of the same difficulties (18), • Bring in a professional facilitator/negotiator to assist with the process of determining how to do this (18) • Bring in outside expertise to facilitate resolution of technical issues or to develop solutions to technical problems (18a, 18b), • Allow a finite amount of time, add a contingency and then put the steering committee in a room until it is resolved. Bring the technicians in to provide feedback regarding the feasibility of the solution and refine as needed (18b, 18c).
19.	Difficulty supporting multiple topology and accuracy needs	a.	Stakeholders decide not to participate	4	2	Mod	P1, P2, P3	• Identify a minimum accuracy required and the minimum accuracy of data available for each item. Don't implement the business needs where the correct accuracy of data doesn't exist until it does exist (19b, 19c), • Identify data that is missing or less accurate than needed and present that information to the WAGIC and the Geographic Subcommittee and try to develop momentum and funding for development of such accuracy (19). • Try to predict when the needed accuracy is available and using a phased approach set up your phases of improvement to handle upgrading accuracy when the needed data is available (19a, 19b, 19c).
		b.	Some business needs are not met	3	4	High	P2, P3, P-P3	
		c.	Increased cost and time of developing the framework	3	3	Mod	P1, P2, P3	
20.	Expectation that the framework interface with specialized applications with proprietary formats	a.	Stakeholders decide not to participate	4	2	Mod	P1, P2, P3	• Prioritize business needs and determine a plan for meeting all reasonable business needs which facilitates specific application needs over time (20), • Identify the most commonly needed data elements and a standard which is the simplest way of storing the data and then provide translators into and out of the database so it can interface with a variety of formats and business needs (20b, 20c),
		b.	Some business needs are not met	3	3	Mod	P1, P2, P3	
		c.	Costs of developing some applications using the framework are more expensive	3	2	Mod	P-P3	

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		d.	The framework isn't used	4	2	Mod	P-P3	• Designate a clear scope which defines what is in WA-Trans and what is not so it is clear from a vary early time which business needs will and will not be met with WA-Trans (20b), • Used a phased implementation to include more data formats and specialized needs in later versions of implementations thus not being exclusionary (20c).
21.	Difficulty building necessary consensus with a multi-participant setting	a.	Timelines and/or budgets are not met	4	3	High	P1, P2, P3	• Determine individual participants needs and motivations and then find the commonalities and try to meet those common needs (21b, 21c), • Use the steering committee to reduce the number of participants in the detailed discussion to more quickly resolve conflicts (21), • Use negotiation techniques and, where needed, a professional negotiator to resolve differences (21), • Develop an alternative analysis so there is a view for how different priorities affect the project (21c), • Allow those with more unique business needs which don't hare data or functionalities with common ones to pay for the additional cost of meeting their needs (21a, 21b), • Use pilots to evaluate alternative approaches to provide data for resolving conflict (21c).
		b.	Stakeholders decide not to participate	4	3	High	P1, P2, P3	
		c.	Results do not meet stakeholder business needs	3	3	Mod	P3	
22.	Stakeholders' conditions and expectations change over time.	a.	Stakeholders quit participating	4	2	Mod	P1, P2, P3	• Clearly define the scope of each implementation phase and use change management to facilitate when that scope needs to change (22b), • Maintain the business needs document over time so changing business climates are being documented (22a, 22c), • Develop a long-term maintenance plan, which includes how continuing improvements can be made to WA-Trans (22a, 22c).
		b.	The scope of the project changes	4	2	Mod	P2, P3	
		c.	Stakeholders business needs are not met	3	3	Mod	P3	

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23.	Concern of stakeholders regarding control and time issues of shared resources and funding	a.	Resources and funding are not made available for the project	3	3	Mod	P1, P2, P3	• Develop comprehensive roles and responsibilities and associated work plan for each shared resource which defines control, coordination and work tasks and deliverables (23a, 23b),
		b.	Constraints are placed upon use of resources or funds	2	3	Mod	P1, P2, P3	• Document each change of resources and what the cost in terms of time, money and expertise to the project in an effort to illustrate the need for resource commitment (23b, 23c),
		c.	The project takes more time than planned	3	3	Mod	P1, P2, P3	• Develop plans with resources provided by sharing and without to show costs and time associated with each and where resources can't be provided seek funding to make up the difference (23).
24.	Participation by stakeholders dwindling over time	a.	Resources and funding are not made available for the project	3	3	Mod	P1, P2, P3	• Provide processes for bringing new steering committee members in as those who can't continue to commit the time leave (24), • Develop a comprehensive communication plan which defines keeping partners engaged including regular communications and interpersonal efforts (24),
		b.	Data needed for the framework is not made available	4	2	Mod	P3	• Have each steering committee member designate an alternate who will serve in their place when the time runs out (24),
		c.	Competing efforts to develop a framework are established.	4	2	Mod	P3	• Use alternative sources for data including orthophotos to compensate for missing data (24b). • As people quit participating make contact with them and find out why. If possible address those issues so they reengage (24).
25.	New stakeholders joining the project after project plan is in place	a.	Scope changes are required	3	2	Mod	P2, P3	• Develop transition processes for introducing new stakeholders to the process (25),
		b.	Business drivers and priorities change	3	4	High	P2, P3	• Gather business needs for new stakeholders and determine the commonalities with those already gathered (25b),
		c.	Time is spent revisiting decisions reached earlier	4	2	Mod	P1, P2, P3	

Legend

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Risk Exposure Level: None, Moderate (Mod), High

Probability Rating: *1* – Impossible, *2* – Improbable, *3* – Probable, *4* – Frequent
Time: *P1* – Phase 1, *P2* – Phase 2, *P3* – Phase 3, *P-P3* – Post Phase 3

Risk #	Risk Condition		Risk Consequence	Imp-act	Prob-ability	Expo-sure	Time	Mitigation Strategy
		d.	The schedule and budget are exceeded	4	3	High	P1, P2, P3	• Develop change management process for handing scope changes once business requirements and prioritization is complete (25a, 25b), • Don't allow revisiting issues to occur unless the majority of the *steering committee* determines it is necessary to do so (25c, 25d), • Provide new stakeholders with all meeting notes so they don't have to revisit issues during meeting time and answer all their questions (25a, 25c, 25d), • Use phased approach for adding functionality and attribution and improving accuracy over time (25).
26.	Inability to form partnerships with the private sector	a.	Business needs are not identified	4	3	High	P1, P2, P3	• Make outreach to logical private partners just as public ones have been included (26), • Identify partners which could provide data and expertise and those which may be able to use WA-Trans and have funds to contribute (26b, 26c), • Use private contacts to find new private contacts and continue to work with them (26), • Determine limitations of public-private partnerships and exploit those where it is logical to do so (26).
		b.	New technologies or methods which could assist are not made available	3	2	Mod	P2, P3	
		c.	Opportunities to leverage data sharing agreements with private partners are not leveraged	3	3	Mod	P2, P3	
27.	Technology is not available or is too costly to implement to support the vision of WA-Trans such as desired attribution, complex functionality, accuracy, access speed, or ease of update.	a.	Framework does not meet business needs and is not used.	4	3	High	P3	• Bring technical experts and companies in to determine feasibility of plans, standards and data models prior to implementation (27), • Use pilot projects to determine the feasibility, cost and risk of doing using new techniques and technologies (27), • Determine the cost of using new technology where available, including the learning curve, with the cost of using older technology when making technical decisions (27), • Develop a technical team, which reports to the steering committee to resolve technical and technology issues and advise the steering
		b.	Attempts to make the framework work with less effective technology fail or take extra time costing significant funding and time.	4	2	Mod	P2, P3	

Legend

Impact Rating: *1* – Negligible, *2* – Marginal, *3* – Critical, *4* – Catastrophic   **Probability Rating:** *1* – Impossible, *2* – Improbable, *3* – Probable, *4* – Frequent

Risk Exposure Level: None, Moderate (Mod), High   **Time:** *P1* – Phase 1, *P2* – Phase 2, *P3* – Phase 3, *P-P3* – Post Phase 3

Risk #	Risk Condition		Risk Consequence	Imp-act	Prob-ability	Expo-sure	Time	Mitigation Strategy
		c.	WA-Trans fails at implementation.	4	2	Mod	P2, P3	resolve technical and technology issues and advise the steering committee on how best to implement them (27).
28.	Large upfront investment is required in infrastructure.	a.	Requires a long time to "pay off".	4	3	High	P2, P3	• Develop cost-benefit analysis, which show payoff rate and focus on business needs that have the highest early payoff first (28a). • Plan for a slow paced implementation with lower expectations meeting a set of business needs which required the lowest cost implementation, building the "budget model"(28b),
		b.	With current funding realities funding is very difficult to get.	3	4	High	P1, P2, P3	• Develop a pilot as a "proof of concept" which will sell the concept to the largest group of potential users with the most money to spend on supporting a wider implementation (28).
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[i] Software Engineering Institute, (1996), <u>Continuous Risk Management Guidebook</u>, Carnegie Mellon University pg.41-45.

[ii] Dueker, K. and Bender, P. (2001), "White Paper on Issues and Strategies for Building a State Transportation Framework", http://www.wsdot.wa.gov/mapsdata/transframework/Trans%20White%20Paper%20Final.pdf

Legend

Impact Rating: *1* – Negligible, *2* – Marginal, *3* – Critical, *4* – Catastrophic

Probability Rating: *1* – Impossible, *2* – Improbable, *3* – Probable, *4* – Frequent

Risk Exposure Level: None, Moderate (Mod), High

Time: *P1* – Phase 1, *P2* – Phase 2, *P3* – Phase 3, *P-P3* – Post Phase 3